SCIENCE

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MSS. intended for publication and books, etc., intended for review should be sent to the responsible editor, Professor J. McKeen Cattell, Garrison-on-Hudson, N. Y.

*THE EARLY PRESIDENTS OF THE AMERICAN ASSOCIATION.**

III.

GOULD.

Gould† was born in Boston in 1824, and was graduated with honors at Harvard twenty years later. He then went abroad and for four years studied under the most distinguished astronomers of Europe, but chiefly under the great Gauss, in Göttingen, where he received his doctor's degree.

In 1848 he returned to Boston, and there —a little more than half a century ago— began the publication of the *Astronomical Journal*, the first and still the only distinct periodical of that science devoted to original investigation in this country.

Then came his valuable connection with the Coast Survey, during which he had charge of the longitude determinations, and subsequent to the laying of the Atlantic cable in 1866, he connected the two continents by precise observations. These first determinations of transatlantic longitude by telegraph were the means of establishing a connected series of longitude measurements from the Ural Mountains to New

* Address of the Vice-President and Chairman of Section I of The American Association for the Advancement of Science, Columbus Meeting, August, 1899.

† See sketch with engraved portrait on wood in *Popular Science Monthly*, Vol. XX., p. 683. March, 1882.

JOHN WELLS FOSTER.

Orleans. In the successful accomplishment of this work he anticipated his English colleagues, and so added greater renown to the advancement of American science.

From 1856 to 1859 he was director of the Dudley Observatory in Albany, and superintended its construction. It was in this building that the normal clock, protected from atmospheric variations and furnished with barometric compensation, was first used to give time telegraphically to dials throughout the observatory; indeed, as improvements of his own suggestion were established, the service was extended until it was that clock that gave the time signals to New York. The three years of his valuable services to science at Dudley were marred by a famous controversy, the discussion of which cannot be taken up here. It had to do with the important question as to whether the wishes of a board of trustees should be carried out by a scientific director. Gould absolutely declined to accept the dictates of those who determined to compel him to adopt a policy which was opposed to that which he regarded as best for the scientific development of the observatory. Firm in his belief as to what was right, he declined to resign, and finally, by process of law, was removed from his directorship. Gould fought his fight bravely and honestly, and though in the end he was unsuccessful, still to his credit it must be said, he never yielded his ground.

The great event of his life was the magnificent work accomplished by him while director of the National Observatory of the Argentine Republic in Cordoba. In 1868 he was called to the organization of the observatory there, and after obtaining from Europe a complete outfit of instruments, superintended the erection of the observatory.

He began work in 1870. Of the work accomplished he said:

The original purpose was to make a thorough survey of the southern heavens by means of observations in zones between the parallel of 30° and the polar circle; but the plan grew under the influence of circumstances, until the scrutiny comprised the whole region from the tropic to within 10° of the pole—somewhat more than 57° in width, instead of 37°. Although it was no part of the original design to perform all the numerical computations, and still less to bring the results into the form of a finished catalogue, it has been my exceptional privilege, unique in astronomical history so far as I am aware, to enjoy the means and opportunity for personally supervising all that vast labor, and to see the results published in their definite, permanent form.*

It was also under his direction that the Argentine Meteorological Service was established in 1872, and its work he described as follows:

At the end of the year 1884 there were already twenty-three points at which the observations had been continuously made, three times a day, for at least four years, and sixteen others at which they had already been continued for more than two years. These have provided the necessary data for constructing the isothermal lines, with tolerable precision, for all of South America from the Torrid Zone to Cape Horn.†

His work done, and well done, he came home to pass the evening of his life with the friends and associates of his early years. His return to the United States was celebrated by a dinner, at which those who knew him best, greeted him with glad words of welcome. Holmes wrote for that occasion:

Once more Orion and the sister Seven
Look on thee from the skies that hailed thy birth—
How shall we welcome thee, whose home was Heaven,
From thy celestial wanderings back to earth?

* Addresses at the Complimentary Dinner to Dr. Benjamin Apthorp Gould, p. 15.

† Idem, p. 17.

Fresh from the spangled vault's o'erarching splendor,
Thy lonely pillar, thy revolving dome,
In heartfelt accents, proud, rejoicing, tender,
We bid thee welcome to thine earthly home.*

Advancing years came pleasantly to him. In Cambridge he reëstablished the *Astronomical Journal*, the special pride of his early life, and honors, such as are accorded only to the very great, came to gladden him with their special significance of recognition and appreciation. A dozen peaceful years were spent in the quiet of his own home before the end came, and then he passed beyond the stars to his new home in the far-away skies.

The meeting in Chicago brought into conspicuous notice one of the pioneers in American geology, whose fine attainments had been honored locally by his election to the presidency of the Chicago Academy of Sciences. Our Association was quick to recognize the growing advancement of science in the west by electing John Wells Foster to preside over the Salem meeting in 1869.

FOSTER.†

Foster was born in Petersham, Massachusetts, in 1815, and was a lineal descendant of Myles Standish, of Mayflower celebrity. He was educated at Wesleyan University, and then studied law. In the early thirties Ohio was still the El Dorado of New England, and Foster settled in Zanesville, where he completed his law studies and was admitted to the bar.

In 1847 the national government instituted a geological survey of the Lake Superior region, which at that time was attracting much attention, owing to the discovery of the copper deposits there. Charles T. Jackson was appointed in charge of the expedition, and he chose as his assistants Foster and Josiah D. Whitney. On the completion of the work, two years later, the preparation of the report was assigned to the younger men. The two slender volumes were published by Congress, and still remain the accepted authority on the subject of which they treat. It was at the Cincinnati meeting of our Association in 1851, that the elder Agassiz 'declared it to be one of the grandest generalizations ever made in American geology.'

He returned to Massachusetts and was active in politics, serving for some years as one of the Governor's executive council, but in 1848 he again went west, and Chicago became his permanent home. For some years he had charge of the land department of the Illinois Central Railroad and then held a similar connection with the Chicago and the Illinois Central Railroad, and then held a similar connection with the Chicago & Alton Railroad, but he relinquished these appointments to return to the pursuit of science, and accepted a chair of natural history in Chicago.

He was the author of 'The Mississippi Valley, Its Physical Geography,' which gave valuable sketches of the topography, botany, climate and geology of that part of the United States. His last work, published shortly before his death, was on Prehistoric Races of the United States, and gave the results of his investigations of the mounds found in various places in the Western States. He was the editor of the *Lakeside Monthly*, and a frequent contributor to literary and scientific periodicals. It was said of him that "his varied experience, his wide and accurate knowledge of facts, his intellectual comprehensiveness, and discriminativeness made him the peer of the foremost scholars of his time, while his personal and social qualities made him respected and loved by all who came within the radius of his winning personality." He died in 1873.

* Addresses at the Complimentary Dinner to Dr. Benjamin Apthorp Gould, p. 22.

† A portrait of John Wells Foster is published as Frontispiece.

CHAUVENET.

The gathering in the west was succeeded by one in the east, and Troy, N. Y., was selected as the meeting place of our Association in 1870. William Chauvenet was chosen to preside, but as the time came for the gathering of the scientists his health was so precarious, and his end so near, that he was unable to be present, and the vice-president, Thomas Sterry Hunt, occupied the chair. Both names are included in the list of our presidents, and a brief sketch of each is therefore given.

Chauvenet* was born in Milford, Pennsylvania, in 1824, and was graduated at Yale in 1840. The mathematical ability that he had shown while in college led to his prompt appointment as assistant to Alexander D. Bache, who gave him charge of the reduction of the meteorological observations then being carried on at Girard College. A year later, however, in 1841, he received an appointment as professor of mathematics in the United States Navy, and continued in that capacity until 1859. At first he served on board of the steamer *Mississippi*, and later at the Naval Asylum in Philadelphia, but he became greatly interested in the proposed establishment of the United States Naval Academy, in Annapolis, and when that institution became a reality he was transferred there, receiving the chair of astronomy, navigation, and surveying, and was 'always the most prominent of the academic staff.'†

In 1855 the chair of mathematics, and in 1859 the chair of astronomy and natural philosophy, at his *alma mater*, were offered to him, but the rigors of the northern winters he feared would be too severe for his delicate constitution, and he declined to accept either of them. But in the last-named year he was called to the professorship of mathematics in the then recently founded Washington University in St. Louis, and in 1862 he was made chancellor of that university, but two years later failing health compelled him to abandon all active work, and he sought recuperation in travel. In 1865, with apparently restored health, he was able to practically resume his duties, but four years later he was obliged to relinquish them entirely. It was at that time that he was elected to the presidency of our Association, but he was unable to attend the meeting, and in December, 1870, he died in St. Paul, Minnesota. Mention should be made of the fact that he served the Association as general secretary at the Springfield meeting in 1859.

There have been men of extraordinary ability, there have been men of great talents, and there have been famous students who have laboriously worked out important discoveries, among those who have held the high office of president of our Association, but among them all, two only, Hunt and Cope, it seems to me, possessed those brilliant mental qualities which are the natural endowments of genius.

HUNT.

Hunt* was born in Norwich, Connecticut, in 1826, and was descended from William Hunt, one of the founders of Concord, Massachusetts, in 1635. His maternal grandfather was Consider Sterry, of Norwich, a well-known mathematician and civil engineer in his time. His early education was slight, but as a young man he became laboratory assistant in the chemical

* Biographical Memoirs of the National Academy of Sciences, Washington, 1886, Vol. I., p. 227, William Chauvenet, by J. H. C. Coffin.

† Biographical Memoirs, p. 235.

* See *Popular Science Monthly*, Vol. VIII., p. 486, February, 1876, with an engraved portrait on wood. See also sketch with half-tone portrait in *Engineering and Mining Journal*, November 7, 1891, and sketch by R. W. Raymond in that journal for February 20, 1892. The *Scientific American* of March 19, 1892, likewise contains a sketch of Hunt with a half-tone portrait.

department of Yale under the elder Silliman. Seldom has an opportunity been used to greater advantage, and so quickly did he acquire a knowledge of the sciences presented, that after two years in New Haven he was, in 1847, appointed chemist and mineralogist to the Geological Survey of Canada, a place which he then held for exactly a quarter of a century. During that period, with his unusual powers, he presented to the scientific world those remarkable contributions to the twin studies of chemistry and geology that have gained for him a foremost place among the pioneers of the newer science of geological chemistry. His early papers treated of chemistry. He developed a system of organic chemistry in which all chemical compounds were shown to be formed on simple types represented by one or more molecules of water or hydrogen.* He anticipated Dumas with his researches on the equivalent volumes of liquids, and in 1887 published in book form, under the title A New Basis for Chemistry, a full digest of his papers, forming a complete system of his theory of chemistry.

In 1872 he returned to the United States and accepted the chair of geology in the Massachusetts Institute of Technology made vacant by the retirement of William B. Rogers, and remained in that capacity until 1878, after which New York City became his principal home, and he devoted his leisure, until his death, in perfecting his books, which present in matured form the opinions originally published as addresses or special papers. They include Chemical and Geological Essays; Mineral Physiology and Physiography; and Systematic Mineralogy According to a Natural System, and according to R. W. Raymond, 'constitute a monument to his genius, industry, and learning which certainly cannot be overlooked by the historian of science."*

Three times during the life of our Association has the science of botany been conspicuously honored by the selection of its most distinguished representative to preside over one of our meetings. The first of these occasions was in 1855 when the able Torrey filled the presidential chair with much grace and dignity, and the second was at the Indianapolis meeting in 1871, when Asa Gray was the presiding officer.

GRAY.

Gray† was born in the Sauquoit Valley, in New York, in 1810, and was the son of a farmer. At an early age he showed a greater fondness for reading than for duties around the farm, and his father wisely decided to make a scholar of him. He was sent to school in Clinton, New York, and later to an academy in Fairfield, New York. At the last-named place in compliance with the desires of his father he entered the medical school, and in 1831 received his doctor's degree from that institution. Meanwhile, however, he acquired an interest in natural science, largely through the influence of Dr. James Hadley, the professor of materia medica and chemistry. Farlow says 'he was not at first so much interested in plants as in minerals,'‡ and this is of special interest, for it was about that time that he first met Dana, with whom he ever afterward maintained a close friendship.

* See a Century's Progress in Chemical Theory. *American Chemist*, Vol. V., p. 56, August, 1874.

* *Engineering and Mining Journal*, February 20, 1892.

† See Memorial of Asa Gray reprinted from the Proceedings of the American Academy of Arts and Sciences, and Biographical Memoirs of the National Academy of Sciences, Vol. III., p. 161, Asa Gray, by W. G. Farlow. See also Letters of Asa Gray, by Mrs. Jane Loring Gray, 2 vols. Boston, 1893; and Scientific papers of Asa Gray, selected by Charles S. Sargent. 2 vols. Boston, 1888.

‡ Memorial of Asa Gray, p. 20.

It is also Farlow who is my authority for the statement 'that his passion for plants was aroused by reading the article on Botany in the Edinburgh Cyclopædia,'* and with a fondness for collecting, we learn that even before graduating 'he had brought together a considerable herbarium.'†

It does not appear that he ever practiced medicine, for during the same year that he graduated he became instructor in chemistry, mineralogy, and botany, in the high school in Utica, and he also lectured on these subjects at the medical school.

In 1833 he went to New York, where he joined Torrey, whose assistant he became, and two years later, through Torrey's influence, he was appointed curator and librarian of the Lyceum of Natural History, now the New York Academy of Sciences. About that time the preliminary arrangements for the Wilkes Exploring Expedition were being made, and the place of botanist was accepted by Gray. It was the fact that his friend Gray had accepted an appointment on the expedition that led Dana to consider favorably an invitation to serve as its mineralogist. However, the departure of the expedition was delayed for some time, and in the meanwhile Gray resigned to accept a closer relationship with Torrey, who sought his association in the preparation of his Flora of North America.

The organization of a great university is in many ways a formidable undertaking, and the selection of its faculty is, perhaps, the most difficult of all the problems that come up for consideration. Some sixty years ago the University of Michigan elected Asa Gray as its first professor of botany. He accepted the honor, but asked that he be permitted first to spend a year abroad in study. The splendid opportunities for settling disputed points in American botany, as well as the association with many students of science who have since become eminent, was fruitful of rich results, and so it was that on his return the continuation of the Flora demanded his first attention. The young university in the west lost his services, but botany as a science, was the gainer. Later, perhaps, he might have settled in Ann Arbor, but in 1842 an opportunity, such as comes to but few men, came to him when he was invited to accept the Fisher professorship of Natural History in Harvard. At that time 'there was no herbarium, no library, only one insignificant greenhouse, and garden, all in confusion with few plants of value.'* To describe the development of the botanical department of Harvard, as guided by him, would take more space than I can rightly give, and in this case it is not necessary to attempt it, for in the Memorial of Asa Gray, from which much has already been taken, the story is told by his three friends and associates, Goodale, Watson and Farlow, each of whom succeeded to a share of his work. I may, however, say that at the time of his death, in 1888, the herbarium, the largest and most valuable in America, contained over 400,000 specimens, the library had more than 8,000 titles, the 'insignificant greenhouse' had been increased many fold, and the garden had become the most important of its kind in this country.

Like Louis Agassiz, Wolcott Gibbs, Jeffries Wyman, and other of his great contemporaries at Harvard, his influence as a teacher was remarkable, and it was well said of him that 'he trained up a whole race of botanists, now scattered through all parts of the United States.'† Like Dana, his influence was extended by his text-books throughout the English-speaking world. His Elements of Botany, first published in 1836, became later the Structural and Systematic

* Memorial of Asa Gray, p. 20.
†Idem, p. 20.

* Memorial of Asa Gray, p. 26.
† Idem, p. 28.

Botany. The well-known Manual of the Botany of the Northern United States is still a classic. How Plants Grow and How Plants Behave "found their way where botany as botany could not have gained an entrance, and they set in motion a current which moved in the direction of a higher science with a force which can hardly be estimated."*

In conclusion let me quote the words of Dr. J. E. Sandys, of Cambridge, who, in conferring the Degree of Doctor of Science from that famous old University, said:

> This man who has so long adorned his fair science by his labors and his life, even unto a hoary age, 'bearing,' as the poet says, 'the white blossoms of a blameless life,' him, I say, we gladly crown, at least with these flowerets of praise, with this corolla of honor. For many, many years may Asa Gray, the venerable priest of Flora, render more illustrious this academic crown!†

SMITH.

The brilliant work in chemistry done by J. Lawrence Smith, combined with the fact that prior to his election no representative of chemistry had ever been chosen as president of our Association, had doubtless much to do with his selection to preside over the gathering held in Dubuque, Iowa, in 1872. The wisdom of the choice was confirmed early in that year by his election to the National Academy of Sciences.

Smith‡ was born in Charleston, South Carolina, in 1818, and studied civil engineering at the University of Virginia, but preferring medicine, he was graduated in 1840, at the Medical College in Charleston, submitting as his thesis a valuable paper on 'The Compound Nature of Nitrogen.' As was largely the custom in those days, he spent several years in Europe, passing his winters in Paris, where he studied chemistry with Dumas, toxicology with Orfila, and physics with Becquerel, and his summers in Giessen studying with the immortal Liebig. While he was in Paris the celebrated poison case of Madame La Farge occurred, in which the question of the normal existence of arsenic in the human system was involved, and although he was a student under Orfila, he did not hesitate to differ with his master and review the entire question in a paper, in the conclusion of which in after years, Orfila himself agreed. It was in that way that his interest in medicine became subordinate to that of chemistry.

In 1844 he returned to Charleston, where he entered on the practice of his profession, and during the winter delivered a course of lectures on toxicology in the medical college.

The development of mineral wealth in the different states was beginning to be considered an important matter, and in South Carolina Smith's recognized ability and education led to his appointment as state assayer to test the bullion coming into commerce from the states of Georgia and the two Carolinas. This place he accepted, and so relinquished his practice.

It naturally followed that he should devote some attention to agricultural chemistry, and the great marl beds on which the city of Charleston stands attracted his notice. It was he who "first pointed out the large amount of phosphate of lime in these marls, and was one of the first to ascertain the scientific character of this immense agricultural wealth."* Dr. Smith also made a valuable and thorough investi-

* Memorial of Asa Gray, p. 32.

† Asa Gray, by Walter Deane, with an electrotype portrait, *Bulletin of the Torrey Botanical Club*, Vol. XV., p. 70.

‡ Biographical Memoirs of the National Academy of Sciences, Vol. II., p. 217. John Lawrence Smith, by Benjamin Silliman, with a Bibliography. See also Original Researches in Mineralogy and Chemistry, by J. Lawrence Smith, Louisville, 1884. This memorial volume contains several biographical sketches and a portrait of Dr. Smith.

* Dr. J. B. Marvin in Original Researches, etc., p. 10.

gation into the meteorological conditions, character of soils, and culture affecting the growth of cotton.

This work attracted considerable attention, and in consequence he was regarded by James Buchanan, then Secretary of State, "as a suitable person to meet the call from the Sultan of Turkey for scientific aid in introducing into that kingdom American methods in the culture of cotton."* On reaching Turkey he found that a commission was already engaged on the problem of cotton culture, and as he was about to return, the Turkish government invited him to report on the mineral resources of its territory. This work proved most valuable, and his discoveries of emery deposits in Asia Minor destroyed the monopoly then held by the Island of Naxos.

In 1850 he returned to the United States, and for two years lectured on science in New Orleans, and was elected professor of chemistry in the University of Louisiana, an institution which he said "at present exists but in name." Two years later he was called to succeed Robert E. Rogers in the chair of chemistry in the University of Virginia, and then began with George J. Brush that splendid series of analyses of American minerals. Silliman said of them: "They settled many doubtful points and relegated into obscurity many worthless theories, while clearly establishing others."†

His stay at the University of Virginia was a short one, for at the end of the year he resigned and settled in Washington, where he became connected with the Smithsonian Institution as chemist, also devoting some attention to agricultural chemistry for the Department of Agriculture.

Louisville was the home of his wife's family, and the chair of medical chemistry and toxicology in the University of Louisville, made vacant by the resignation of the younger Silliman, was tendered to him in 1854. That place was promptly accepted, and therefore Louisville became his home. For twelve years he continued his professorial duties, and also manifested his fondness for practical chemistry by his acceptance of the charge of the Louisville Gas Works, and by his establishing with the venerable Dr. Edward R. Squibb a laboratory for the production of chemical reagents and the rarer pharmaceutical preparations.

It was during the year that he was connected with the Smithsonian Institution that our Association met in Washington, and for that meeting he prepared his first memoir on meteorites, a subject to which he had become attracted by his purchasing the collection belonging to Gerald Troost, of Nashville. The study of these interesting bodies became thereafter his favorite subject of investigation, and about forty of his papers were devoted to them. He was active in collecting specimens of American falls, and his collection which contained representatives of 250 falls, passed on his death to Harvard University, swelling that collection until it became the best in the country.

His study of meteorites led naturally to his devising improved methods of analysis, especially of the silicates, and while in Paris on one of his many visits there he became interested in the discovery of new elements in the complex mineral samarskite. He devoted much attention to the isolation of its constituents, and at the St. Louis meeting of our association announced the discovery of what he believed to be a new element, to which he gave the name of Mosandrum. The announcement of the isolation of a new element by a past president, gave to the chemical section in 1878, an impetus and dignity that it has never relinquished. Dr. Smith was also present at the Boston meeting, and it was about that time that he further announced his discovery of certain

* Silliman in Original Researches, etc., p. 27.

† Idem, p. 33.

rare earths, for one of which, should it prove to be an element, he proposed the name of Rogerum, in honor of our William B. Rogers.

Our Association has always been fortunate in its permanent secretaries. They have all been devoted to the interests of the organization and two of them held office for many years. The first permanent secretary was Spencer F. Baird, who was chosen to that office at the Cincinnati meeting in 1851, and continued as such until 1854, when he was succeeded by Joseph Lovering, who then filled the place until 1873, when he in turn was succeeded by the present retiring president, Professor Putnam. Lovering's valuable services were recognized by his election to the presidency in 1872, and he presided over the meeting held in Portland a year later.

MARCUS BENJAMIN.
U. S. NATIONAL MUSEUM.

(To be concluded.)

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*THE CLASSIFICATION OF BOTANICAL PUBLICATIONS.**

A RECENT number of SCIENCE,† in continuation of the discussion of the proposed international catalogue of scientific literature, to which space has been devoted in that journal for some months past, deals with the question of botany, and the article referred to must be considered as my excuse for the presentation to the Society of the following observations, which are intended solely as suggestions which, in part, may be helpful in starting the botanical portion of the proposed catalogue on lines which are likely to make it of the simplicity, coherence and general usefulness which all desire it to possess.

In the article referred to, Professor Bessey has called attention to a paper prepared by the writer, some years since, for the Botanical Seminar of the University of Nebraska, which was intended to present before that body the results reached in the handling of a rather large library, the purpose of which is entirely botanical, applied botany and the arts based thereon of necessity being included. The subject now under consideration, while fundamentally the same as that handled in the unpublished paper referred to, is, however, practically quite different in the details of its management. In the paper referred to, the problem analyzed was that of the arrangement of a library which, devoted to botany, stood in isolation from other libraries, so that many works were of necessity included in it because of their bearing on botanical subjects, although in title and in some instances in substance not at all botanical. The subject requiring consideration in connection with the proposed catalogue, however, is that of a purely botanical library which may be supposed to stand in the closest possible connection with collections of works referring to all other branches of knowledge—or, stated otherwise, the botanical part of a general library—and is, therefore, in many respects a simpler one. The first mentioned can scarcely be so handled as to meet with the approval of general librarians or of librarians whose subjects are restricted but not botanical, because general knowledge and other sciences are of necessity warped therein that they may be bent to the requirements of the single specialty to which each book which finds a place on the shelves is subordinated. The second, on the other hand, calls primarily for a simple but logical classification of botanical knowledge, with provision for the insertion in it of a relatively small number of non-botanical works which are in such frequent demand as to call for the provision of a special copy

* Read before the Columbus meeting of the Botanical Society of America, and by request of the Society before Section G of the American Association for the Advancement of Science at the Columbus meeting.

† N. S. **10**: 46–8. Jl. 13, 1899.